

## **CLASS 464, ROTARY SHAFTS, GUDGEONS, HOUSINGS, AND FLEXIBLE COUPLINGS FOR ROTARY SHAFTS**

### **SECTION I - CLASS DEFINITION**

This is the class for rotary shafts, a rotary shaft being defined as an elongated member intended to be rotated about its longitudinal axis to transmit torque.

This is also the class for gudgeons, a gudgeon being defined as a device secured to the end of a shaft or other rotary body, for rotation therewith, to facilitate mounting the body in a support.

This is also the class for housings, a housing being defined as a structure providing an enclosure surrounding at least a portion of a shaft, a flexible coupling, or a flexible motion transmitting device such as a Bowden Cable; such enclosure functioning to prevent inadvertent contact between an operator or foreign matter and the shaft, flexible coupling, or flexible motion transmitting device; or to retain lubricant or the like within the space surrounded by the enclosure.

This is also the class for flexible couplings for rotary shafts, a flexible coupling being defined as structure interconnecting rotary devices, at least one of them being a shaft, in order to facilitate relative motion between them as they transmit torque, or to enable torque to be transmitted through rotary devices having misaligned or angularly related rotational axes.

A nominal recitation of a device for applying rotary power to, or receiving rotary power from, a structure of this class will not exclude a patent from being placed in this class.

### **SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

A method or apparatus for manufacturing a structure of this class that is not found herein, may be found in an appropriate manufacturing class, such as Class 29, Metal Working; or Class 72, Metal Deforming.

#### **LINE BETWEEN CLASS 192 AND CLASS 464**

Class 192 has couplings of the kind wherein torque transmission may be selectively or automatically disrupted, wherein the couplings of Class 464 are generally intended for continuous torque transmission with provision for relative movement between the coupled mem-

bers while torque is being transmitted. There are, however, exceptions to this general rule as follows:

A. Class 464, in subclasses 32+, has structure wherein torque transmission is disrupted by breakage of a frangible element which may be replaced.

B. Class 464, in subclasses 30+, has overload release couplings wherein relative rotation between coupled members continues so long as an overload condition occurs. The line between Class 464, subclasses 30+, and Class 192, subclass 56.1+, is that Class 464 takes structure wherein relatively rotatable surfaces move with respect to each other during an overload condition; but drive through such surfaces is automatically re-established, without an additional operation, upon correction of the overload condition. Class 192, subclass 56.1+, requires a further operation, in addition to correcting the overload condition, to re-establish the drive; such further operation being, for example, operator assisted re-engagement or reduction in rotational speed of a power input member.

C. Class 464, in subclasses 24+, provides for fluid couplings wherein relative movement between coupled members is facilitated by compression or decompression of a fluid wherein a significant feature is to accommodate relative movement between the coupled members for dampening, buffering, etc. Class 192, subclasses 58.1+, has fluid couplings wherein a fluent material envelops the coupled parts, and the torque transmission occurs via a shearing action in the fluid.

### **SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS**

SEE OR SEARCH THIS CLASS, SUBCLASS:

22, for a cleaning device which is mounted to act on a shaft so as to clean it during normal torque transmission.

### **SECTION IV - REFERENCES TO OTHER CLASSES**

SEE OR SEARCH CLASS:

15, Brushing, Scrubbing, and General Cleaning, subclasses 256.5+ for a cleaning device mounted to act on a moving surface. A cleaning device which is mounted to act on a shaft so as to clean it during normal torque transmission is in Class 464. See Subclass References to the Current Class, above.

- 29, Metal Working, for a method of assembling a structure of this class (464).
- 74, Machine Element or Mechanism, subclasses 15.6+ for a power take-off from a shaft extension; subclasses 18+ for motion transmitting means including a flexible sealing diaphragm connected to a moving rod and a casing; subclasses 380+ for pivotally supported gearing; subclass 411 for structure providing yield ability in gear trains; subclass 443 for sound deadening means associated with rotary bodies; subclasses 489 and 500.5+ for a flexible motion transmitter (e.g., Bowden cable); subclasses 572+ for a flywheel or rotor with balancing or vibration dampening means; and subclasses 606+ for a gear casing.
- 81, Tools, subclasses 467+ for a wrench or screwdriver responsive to torque on the work.
- 105, Railway Rolling Stock, subclass 131 for a resilient wheel or axle drive.
- 123, Internal-Combustion Engines, subclass 406.75 for spark ignition timing controlled by a centrifugal timing mechanism.
- 138, Pipes and Tubular Conduits, subclasses 118+ for a flexible conduit.
- 152, Resilient Tires and Wheels, appropriate subclasses for a connection which facilitates relative movement between a rim and a hub on a wheel.
- 160, Flexible or Portable Closure, Partition, or Panel, subclass 326 for a combined roller and gudgeon in a roller for accumulating material on a roll.
- 172, Earth Working, subclasses 261+ for an earth-working element combined with means permitting said element to shift in response to an overload condition.
- 173, Tool Driving or Impacting, subclasses 93.5+ for a rotary tool drive having a torque responsive impact in an impacting device; and subclasses 165+ for means to drive a tool about an axis and including a relatively fixed drive for an advancing tool.
- 175, Boring or Penetrating the Earth, subclass 195 for a rotary drive table for a relatively advancing tool. See the Class 175 Class Definition, References to Other Classes, the Search Note to Class 464 and see also Class 175, subclass 320, (2) Note, for a statement of the line.
- 180, Motor Vehicles, subclasses 254+ for a vehicle having a driven and steerable wheel and including a flexible drive transmitting means for transmitting torque to the wheel.
- 184, Lubrication, for lubrication systems, per se; but if a shaft or flexible coupling includes structure which is modified so as to admit lubrication, classification is in Class 464, subclasses 7+.
- 192, Clutches and Power-Stop Control, subclasses 56.1+ for an overload release clutch; subclasses 58.1+ for a fluent material clutch; subclasses 84.1+ for an electric operator for a clutch; subclasses 85+ for a fluid pressure operator for a clutch; subclasses 103+ for a speed responsive operator; and subclasses 200+ for a clutch element combined with means for resiliently mounting such element on a hub. In general, Class 192 has couplings of the kind wherein torque transmission may be selectively or automatically disrupted, wherein the couplings of Class 464 are generally intended for continuous torque transmission with provision for relative movement between the coupled members while torque is being transmitted. For exceptions to this general rule, see Lines With Other Classes and Within This Class, Line Between Class 192 and Class 464, above.
- 200, Electricity: Circuit Makers and Breakers, subclass 19.28 for ignition distributors with centrifugal advance mechanism.
- 241, Solid Material Comminution or Disintegration, subclass 32 for overload release means for comminution apparatus, and subclasses 291+ for significant comminuting structure mounted on a drive shaft therefor.
- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 504 for a dynamic, circumferential contact seal for other than a piston that accommodates gyratory or oscillatory motion by using a flexible connection having static contact between the seal and one of the relatively movable parts; subclasses 549+ for a dynamic circumferential contact seal for other than a piston having a peripheral radially sealing flexible projection (e.g., lip seal, etc.) or subclasses 634+ for a static, contact seal for other than an internal combustion engine, or a pipe, conduit, or cable that is a flexible sleeve, boot, or diaphragm.
- 279, Chucks or Sockets, subclass 16 for a self-centering or floating chuck or socket.
- 285, Pipe Joints or Couplings, appropriate subclasses for a coupling between fluid conducting pipes.
- 295, Railway Wheels and Axles, subclasses 36.1+ for an axle of that class.

- 301, Land Vehicles: Wheels and Axles, subclasses 124.1+ for an axle of that class.
- 310, Electrical Generator or Motor Structure, subclasses 75+ for a drive mechanism which may include a flexible shaft, and subclasses 92+ for torque transmitting clutches.
- 403, Joints and Connections, appropriate subclasses for a joint or connector, per se. If, however, a coupling between torque transmitting members is such as to facilitate connection or relative movement between members having misaligned or angularly related axes, then such coupling is in Class 464. See Class 403, subclasses 52+ for a joint between articulated members other than rotary torque transmitting members.
- 409, Gear Cutting, Milling, or Planing, subclasses 231+ for a cutter spindle or spindle support.
- 433, Dentistry, subclass 112 for a flexible shaft transmission in a dental apparatus.
- 440, Marine Propulsion, subclass 83 for shafting combined with a screw propeller in marine propulsion apparatus.
- 474, Endless Belt Power Transmission Systems or Components, subclass 94 for a flexible connection between a pulley or guide roll rim and its mount.
- 475, Planetary Gear Transmission Systems or Components, subclasses 346+ (and see The Search Notes therein) for a flexible coupling in a planetary gear arrangement.
- 492, Roll or Roller, for a roll, per se, not elsewhere provided for, and see the search notes thereunder.

#### SUBCLASSES

- 1 SPEED RESPONSIVE DEVICE FOR ADJUSTING RELATIVE ROTATIONAL POSITION OF COUPLED MEMBERS:**  
This subclass is indented under the class definition. Flexible coupling structure wherein a shaft and another member are mounted for relative rotation about a common axis and wherein means is provided to sense velocity or change of velocity of the shaft or other member and responsive to such sensed velocity or change of velocity, said means acts directly or indirectly to alter the relative rotational position of the shaft and other member between predetermined relative rotational positions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 160+, for a coupling other than speed responsive to adjust the relative rotational position of coupled members.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 406.75 for spark ignition timing controlled by a centrifugal timing mechanism.
- 200, Electricity: Circuit Makers and Breakers, subclasses 19.21+ for an ignition distributor with centrifugal advance mechanism.

**2**

#### **Actuated by fluid or electricity:**

This subclass is indented under subclass 1. Subject matter wherein said means acts through the medium of force derived from fluid or electrical power to alter the relative rotational position of the shaft and the other member.

**3**

#### **Pivoted weight:**

This subclass is indented under subclass 1. Subject matter wherein said means comprises a mass swingably mounted for movement about a pivotal axis in response to centrifugal force caused by rotation of the shaft or other member.

**4**

#### **Gear segment on pivoted weight:**

This subclass is indented under subclass 3. Subject matter wherein the relative rotational positions of the shaft and the other member are altered via gear teeth formed on or carried by the swingable mass so as to interact with another set of gear teeth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 109, for a gear segment associated with a coupling which accommodates drive between members having misaligned or angularly related axes.

**5**

#### **Pivotal movement opposed by compression of coil spring along its axis:**

This subclass is indented under subclass 3. Subject matter wherein a helically wound device, which is resiliently compressible along its longitudinal axis, is mounted with respect to

said swingable mass in such a manner that movement of said mass by centrifugal force is opposed by the resilient compression of said device.

**6 Pivotal movement opposed by expansion of coil spring along its axis:**

This subclass is indented under subclass 3. Subject matter wherein a helically wound device, which is resiliently expansible along its longitudinal axis, is mounted with respect to said swingable mass in such a manner that movement of said mass by centrifugal force is opposed by the resilient expansion of said device.

**7 HAVING LUBRICATING MEANS:**

This subclass is indented under the class definition. Subject matter provided with means for directing or applying a fluid substance between relatively movable surfaces to reduce friction between such relatively movable surfaces.

SEE OR SEARCH CLASS:

184, Lubrication, appropriate subclasses for lubrication systems, per se.

**8 Lubricant impregnated into material:**

This subclass is indented under subclass 7. Subject matter wherein said lubricant is applied by means of a porous surface and wherein said porous surface is permeated by said fluid substance so that said flowable substance is located on and beneath the surface of said device throughout the extent of said porous surface.

**9 Metallic material:**

This subclass is indented under subclass 8. Subject matter wherein said permeated device is made of metal.

**10 For overload release coupling:**

This subclass is indented under subclass 7. Subject matter wherein said relatively movable surfaces are associated with flexible coupling structure which permits relative rotation between torque input and output members for as long as said output member is subjected to a resistance to rotation greater than a predetermined value.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

30+, for an overload release coupling.

**11 For coupling having torque transmitted via radially directed pin received in conforming aperture:**

This subclass is indented under subclass 7. Subject matter wherein said relatively movable surfaces are associated with flexible coupling structure including a first part carried by one member of the coupling, said first part being in the form of a right cylinder with the axis of the cylinder extending perpendicularly to, and radially outwardly from, the axis of rotation of said one member of the coupling; and including a second part carried by the coupling, said second part comprising means defining an opening for receiving said first part.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

112+, for a coupling which transmits torque via a radially directed pin.

**12 Lubricant supplied to plural pins via common ring which encapsulates pins:**

This subclass is indented under subclass 11. Subject matter wherein coupling structure includes a plurality of circumferentially spaced right cylindrical parts, and said structure further includes an annular member enclosing said parts, said annular member comprising walls defining a path for flow of said substance from one to another of said parts.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

125+, for a ring which receives plural pins.

**13 Pin includes longitudinally extending internal passage:**

This subclass is indented under subclass 12. Subject matter wherein at least one of said right cylindrical parts includes means defining a flow path for said fluid, said flow path being located internally of the external surface of said part and extending in a direction parallel to said axis of said part.

- 14 Pin includes longitudinally extending internal passage:**  
This subclass is indented under subclass 11. Subject matter wherein said right cylindrical part includes means defining a flow path for said fluid, said flow path being located internally of the external surface of said part and extending in a direction parallel to the axis of said part.
- 15 For coupling having torque transmitted via a ball:**  
This subclass is indented under subclass 7. Subject matter wherein said relatively movable surfaces are associated with flexible coupling structure including a spherical part for transmitting torque between said relatively movable members.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
139+, for a coupling which transmits torque via a radially spaced ball.
- 16 For coupling having torque transmitted via intermeshing teeth:**  
This subclass is indented under subclass 7. Subject matter wherein said relatively movable surfaces are associated with flexible coupling structure including alternating ridges and valleys on each of said coupled members, the ridges of one member being received within the valleys of the other member, and wherein torque is transmitted by surface engagement of the ridges of one member with the ridges of the other member.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
157+, for a coupling which transmits torque via intermeshing teeth.
- 17 HAVING HEATING OR COOLING MEANS:**  
This subclass is indented under the class definition. Subject matter provided with means for applying heat to or extracting heat from said subject matter.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, for heating or cooling means, per se.
- 18 FLEXIBLE COUPLING BETWEEN FLUID-CONDUCTING ROTARY SHAFTS (E.G., COUPLING BETWEEN SECTIONS OF DRILL STRING, ETC.):**  
This subclass is indented under the class definition. A flexible coupling for interconnecting plural shafts, said shafts being of tubular construction for conducting a fluid internally of the shaft along the length thereof.
- SEE OR SEARCH CLASS:  
175, Boring or Penetrating the Earth, subclasses 320+ for a tool shaft detail, and see the reference to Class 175 in the search class notes under the class definition of Class 464.  
285, Pipe Joints or Couplings, appropriate subclasses for a coupling between fluid conducting pipes.
- 19 Relative angular displacement of axes of shafts:**  
This subclass is indented under subclass 18. Subject matter wherein said coupling facilitates changing the angle defined by the longitudinal axes of the shafts with respect to each other.
- 20 Including member deformable by relative movement between shafts:**  
This subclass is indented under subclass 18. Subject matter and further including a part which is deformed when one of said shafts moves relative to the other of said shafts.
- 21 Member is coiled spring:**  
This subclass is indented under subclass 20. Subject matter wherein said part is a helically wound resilient device.
- 22 HAVING CLEANING MEANS:**  
This subclass is indented under the class definition. Subject matter provided with means associated with such subject matter to maintain its cleanliness during operation.
- (1) Note. For a patent to be placed herein, the cleaning device must be particularly adapted to be associated with a subject matter of this class to provide cleaning during torque transmission. If the device is of general utility and not particularly adapted to be mounted on operating members of this class, classification is in

a class appropriate for cleaning of general utility, such as Class 15 or 134.

**SEE OR SEARCH CLASS:**

15, Brushing, Scrubbing, and General Cleaning, subclasses 256.5+ for a cleaning device mounted to act on a moving surface.

**23 WITH AUXILIARY INDICATOR OR ALARM:**

This subclass is indented under the class definition. Subject matter and further including a separate device for indicating a condition thereof or for providing a warning that an undesirable condition exists.

**24 FLUID COUPLING:**

This subclass is indented under the class definition. A flexible coupling wherein a liquid or gas is used to affect or effect the coupling.

**SEE OR SEARCH CLASS:**

192, Clutches and Power-Stop Control, subclasses 58.1+ wherein a fluent material envelops the coupled parts; subclasses 85+ for a fluid pressure operator for a clutch; and see the reference to Class 192 in the search class notes under the general definition of Class 464 for a statement of the line.

**25 For transmitting limited pulsating torque (e.g., fluid drive coupling for impulse tool):**

This subclass is indented under subclass 24. Subject matter including structure for applying torque in cyclical pulses from an input member to a relatively rotatable output member through the medium of said liquid or gas, and wherein means is provided to limit the maximum torque applied during each pulse.

**SEE OR SEARCH CLASS:**

81, Tools, subclasses 467+ for a wrench or screwdriver responsive to torque on the work.

**26 Including piston axially movable in cylinder having axis coextensive with axis of rotation of coupled members:**

This subclass is indented under subclass 24. Subject matter wherein the liquid or gas is contained within a cylinder having an axis which is aligned with the rotational axis of the coupled

members, and wherein a piston is mounted within the cylinder for reciprocable movement along the axis of the cylinder.

**27 Including multiple piston-cylinder devices radially spaced from axis of rotation:**

This subclass is indented under subclass 24. Subject matter wherein a plurality of cylinders containing the liquid or gas are located in a position radially spaced from the axis of rotation of the coupled members, each of said cylinders having a piston reciprocable therein.

**28 Fluid confined in enclosure having flexible walls:**

This subclass is indented under subclass 24. Subject matter wherein the liquid or gas is contained within a device having walls made of flexible material.

**29 ELECTRICAL OR MAGNETIC COUPLING:**

This subclass is indented under the class definition. A flexible coupling including electrical or magnetic means for affecting or effecting the coupling.

**SEE OR SEARCH CLASS:**

192, Clutches and Power-Stop Control, subclasses 84.1+ for an electric operator for a clutch.

**30 OVERLOAD RELEASE COUPLING:**

This subclass is indented under the class definition. A flexible coupling wherein means is provided for transmitting torque between input and output members so as to accommodate relative rotation between said members when resistance to rotation of said output member exceeds a predetermined value, said means including either (a) a device which is designed to rupture when said resistance to rotation exceeds said predetermined value, or (b) a device which slips or disengages when said resistance to rotation exceeds said predetermined value but which automatically reengages without operator intervention or other additional operation when said resistance to rotation no longer exceeds said predetermined value.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 10, for an overload release coupling including means to supply a lubricant to relatively rotating surfaces.
  - 25, for a coupling for transmitting a limited pulsating torque via a fluid.
- SEE OR SEARCH CLASS:
- 81, Tools, subclasses 467+ for a wrench or screwdriver responsive to torque on the work.
  - 172, Earth Working, subclasses 261+ for an earthworking element combined with means permitting said element to shift in response to an overload.
  - 173, Tool Driving or Impacting, subclass 93.5 for a rotary tool drive having torque responsive impact in an impacting device.
  - 192, Clutches and Power-Stop Control, subclasses 56.1+ for an overload release clutch, and see a statement of the line in the search class notes following the general definition of Class 464.
  - 241, Solid Material Comminution or Disintegration, subclass 32 for an overload release means for comminution apparatus.
- 31 Including thermally responsive element:**  
This subclass is indented under subclass 30. Subject matter wherein said means includes a device for sensing the temperature of a part in said coupling, and in response to said sensed temperature, controlling the relative rotation between the members.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 17, for class subject matter including an auxiliary device to apply heat to or extract heat from such subject matter.
- 32 Torque transmitted via frangible element:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from the input member to the output member through the medium of a device which is designed to rupture when the resistance to rotation is greater than said predetermined value.
- 33 Axially extending pin:**  
This subclass is indented under subclass 32. Subject matter wherein the device is an elongated rodlike element mounted so that the longitudinal extent of the element is parallel to, or coextensive with, the axis of rotation of the coupled members.
- 34 Torque transmitted via radially spaced deformable roller:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from the input to the output member through the medium of a device rotatable about its own axis and spaced radially from the axis of rotation of the members, and wherein the device is made of a material capable of being deformed to accommodate said relative rotation.
- 35 Torque transmitted via a ball:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from the input to the output member through the medium of a spherical element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 139+, for a coupling which transmits torque via a radially spaced ball to accommodate drive between members having misaligned or angularly related axes.
- 36 Axially biased:**  
This subclass is indented under subclass 35. Subject matter wherein the spherical element is resiliently biased along a line of force parallel to the rotational axes of the driving and driven members.
- 37 Torque transmitted via resiliently biased positive drive connection (e.g., cam and follower):**  
This subclass is indented under subclass 30. Subject matter wherein one of said input or output members, or an intermediate member, includes a contoured face; and the other of said input or output members, or an intermediate member, includes or carries a device resiliently biased into engagement with the contoured face to provide a positive drive connection for transmitting torque between the input and output members by contact of the device with an abutment forming a part of the contoured face,

- and wherein the shape of the abutment is such as to force the device against its resilient bias in a direction away from the abutment to permit said relative rotation when said resistance to rotation exceeds said predetermined value.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
35+, wherein the torque transmitting element is a ball.
- 38 Axially biased:**  
This subclass is indented under subclass 37. Subject matter wherein the resilient bias of said device into engagement with said contoured surface is along a line of force parallel to the rotational axes of the driving and driven members.
- 39 By spring coiled about axis of rotation:**  
This subclass is indented under subclass 38. Subject matter wherein the resilient bias is provided by a device helically wound about the axis of rotation of the driving and driven members.
- 40 Torque transmitted via frictional engagement of coil spring:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from the input member to the output member through the medium of a helically coiled resilient device which frictionally engages one of said members to transmit torque, but which slips when said resistance to rotation is greater than said predetermined value.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
57+, for a flexible coupling wherein torque is transmitted via a coiled spring.
- 41 Torque transmitted via plural circumferentially spaced friction elements:**  
This subclass is indented under subclass 30. Subject matter wherein one of said input or output members includes or carries a plurality of discrete frictional elements circumferentially spaced from each other about the axis of rotation of said one of said members, said frictional elements having surfaces engaged with a surface or surfaces on the other of said members to transmit rotation, the engaged surfaces slipping when the resistance to rotation exceeds said predetermined value.
- 42 Torque transmitted via frictional engagement of conical or frustoconical surfaces:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from said input member to said output member by frictional engagement of surfaces having the shape of a cone or the frustum of a cone.
- 43 With separate resilient member for biasing surfaces into engagement:**  
This subclass is indented under subclass 42. Subject matter which further includes a disparate resilient device for biasing the conical or frustoconical surfaces into engagement.
- 44 Coil spring:**  
This subclass is indented under subclass 43. Subject matter wherein the resilient device is a helically coiled resilient member.
- 45 Torque transmitted via frictional engagement of planar radially extending surfaces:**  
This subclass is indented under subclass 30. Subject matter wherein rotation is transmitted from said input member to said output member by frictional engagement of surfaces which extend in a direction radially outwardly from, and in a plane perpendicular to, the axis of rotation of the driving and driven members.
- 46 With separate resilient members for biasing surfaces into engagement:**  
This subclass is indented under subclass 45. Subject matter which further includes a disparate resilient device for biasing the frictionally engaged surfaces into engagement.
- 47 Coil spring:**  
This subclass is indented under subclass 46. Subject matter wherein the resilient device is a helically coiled resilient member.
- 48 Plural, circumferentially spaced coil springs:**  
This subclass is indented under subclass 47. Subject matter including a plurality of helically coiled resilient members spaced circumferentially from each other about the rotational axis of the driving and driven members.



**49 COUPLING DEVICE INCLUDES ENDLESS CHAIN ENGAGED WITH CIRCUMFERENTIAL TEETH ON COUPLED MEMBERS:**

This subclass is indented under the class definition. A flexible coupling wherein the coupled members are axially spaced from each other, and each includes a plurality of circumferentially spaced, radially extending teeth, and wherein coupling structure includes a closed loop chain having grooves or openings spaced along the length thereof for receiving the teeth on the coupled members.

**50 COUPLING DEVICE INCLUDES ANGLED OR HINGED ROD HAVING OPPOSITE ENDS RELATIVELY RECIPROCABLE AXIALLY IN BORES IN SPACED COUPLED MEMBERS:**

This subclass is indented under the class definition. A flexible coupling comprising an axially elongated member which is bent along its longitudinal axis or which is formed or pivotally connected sections, the opposite ends of said member being mounted for relative reciprocable axial movement in openings formed in axially spaced coupled members.

**51 TORQUE TRANSMITTED VIA FLEXIBLE ELEMENT:**

This subclass is indented under the class definition. A shaft or flexible coupling as defined in the ... wherein said shaft or flexible coupling includes an element through which rotational torque is transmitted, and wherein said element is made of a material which is flexible.

- (1) Note. While all materials may have at least some minimal inherent flexibility, for a patent to be placed in this and indented subclasses, such flexibility must be intended to be used as a desirable feature in the functional operation of the device.

**SEE OR SEARCH CLASS:**

- 74, Machine Element or Mechanism, subclass 411 for structure providing yield ability in gear trains; subclass 443 for sound deadening means associated with rotary bodies; and subclasses 489 and 500.5+ for a flexible push-pull

motion transmitting means such as a Bowden cable.

- 105, Railway Rolling Stock, subclass 131 for a resilient drive for a wheel or axle.
- 180, Motor Vehicles, subclasses 254+ for a vehicle having a driven and steerable wheel and including a flexible drive transmitting means for transmitting torque to the wheel.
- 192, Clutches and Power-Stop Control, subclasses 200+ for a clutch element combined with means to resiliently mount such element on a hub.
- 279, Chucks or Sockets, subclass 16 for a self-centering or floating chuck or socket.
- 310, Electrical Generator or Motor Structure, subclasses 75+ for a drive mechanism which may include a flexible shaft.
- 433, Dentistry, subclass 112 for a flexible shaft transmission in a dental apparatus.
- 474, Endless Belt Power Transmission Systems or Components, subclass 94 for a flexible connection between a pulley or guide roll rim and its mount.

**52 With stationary housing:**

This subclass is indented under subclass 51. Subject matter and further including a housing as defined in the class definition, said housing being nonrotatable with said shaft or coupling.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 170+, for a housing, per se, for a shaft or coupling.

**53 And threaded annulus surrounding terminal end of housing for attachment to auxiliary housing:**

This subclass is indented under subclass 52. Subject matter wherein an annular, threaded connector device extends around the end of said housing, said threads on said connector cooperating with complementary threads on another housing to secure said housings together.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

177, for separably connected housings for separably connected shafts.

**54 Element coiled sinusoidally about axially spaced driving and driven members:**

This subclass is indented under subclass 51. Subject matter wherein said element is bent into the general shape of a sine curve, and wherein the bends of the element are curved about portions of driving and driven members spaced apart from each other in the direction of the longitudinal axis of rotation of the members.

**55 Element is flaccid and operates in tension during torque transmission (e.g., belt, cable, etc.):**

This subclass is indented under subclass 51. Subject matter wherein said element is limp or sags under its own weight, said element being connected to driving and driven members at points spaced from each other along the longitudinal extent of said element so that rotary torque transmitted from the driving to the driven member via said element places said element in tension.

**56 Element has circular cross section:**

This subclass is indented under subclass 55. Subject matter wherein a cross section in a plane perpendicular to the longitudinal extent of the element is generally circular.

**57 Element has plural convolutions wound about rotational axis:**

This subclass is indented under subclass 51. Subject matter wherein said element is elongated and coiled about a longitudinal centerline which is the rotational axis of said element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

40, for a spring which transmits torque by frictional engagement in an overload release coupling.

**58 Plural radially overlapping convoluted elements:**

This subclass is indented under subclass 57. Subject matter and further including an additional elongated torque transmitting element

coiled about the same longitudinal centerline in a manner such that one of said elongated elements overlaps the other in a direction extending radially outwardly of said rotational axis.

**59 Single element has plural radially overlapping convolutions:**

This subclass is indented under subclass 57. Subject matter wherein said element is wound in a plurality of successive radially overlapping coils.

**60 Convoluted element has noncircular cross section:**

This subclass is indented under subclass 57. Subject matter wherein the shape of a transverse cross section taken through said element is other than circular.

**61 Element is a spring coiled about centerline angularly related to or radially spaced from rotational axis:**

This subclass is indented under subclass 51. Subject matter wherein said element is a helically coiled resilient element, and wherein the center line of the helix is either radially spaced from or extends at an angle to the rotational axes of members interconnected by said element.

**62 Plural springs:**

This subclass is indented under subclass 61. Subject matter and further including an additional helically coiled element having its centerline radially spaced from or extending at an angle to the rotational axes of members interconnected by said elements.

**63 Centerline of springs axially spaced from each other along rotational axis:**

This subclass is indented under subclass 62. Subject matter wherein the centerline of the helix of one of the elements is spaced from the centerline of the helix of the other of the elements in an axial direction along the rotational axes of members interconnected by said elements.

**64 Plural superposed springs on common centerline:**

This subclass is indented under subclass 62. Subject matter wherein both of the elements are coiled about a common centerline, and wherein one of the elements overlaps the other.

**65 Centerline of springs radially spaced from and parallel to rotational axis:**

This subclass is indented under subclass 62. Subject matter wherein the centerline of each of the elements is spaced radially outwardly from and extends parallel to the rotational axis of members interconnected by said elements.

**66 Opposite ends of springs are equidistant from rotational axis:**

This subclass is indented under subclass 62. Subject matter wherein the distance on a radial line extending from the rotational axis to the centerline of the element at one end of the element is the same as the distance on a radial line extending from the rotational axis to the centerline of the element at the opposite end of the element.

**67 Springs on circumferentially extending curved centerline:**

This subclass is indented under subclass 66. Subject matter wherein the centerline of said element is curved and extends in circumferential direction radially spaced from the rotational axes of members interconnected by said elements.

**68 Springs positioned between axially spaced plates of one member and driven by other member extending radially between said plates:**

This subclass is indented under subclass 66. Subject matter wherein driving and driven members are resiliently connected by said elements, one of said members including a pair of plates spaced apart axially from each other along the rotational axis, said elements being received in the space between said plates, and the other of said members including a radial projection extending between said plates and engaging said elements for said radial projections to drive said plates via said elements.

**SEE OR SEARCH CLASS:**

192, Clutches and Power-Stop Control, subclasses 200+ for a clutch element combined with means to resiliently mount such element on a hub.

**69 Plural flexible links connected to circumferentially spaced axially directed pins on drive and driven members:**

This subclass is indented under subclass 51. Subject matter wherein driving and driven members each include a plurality of connector pins extending in an axial direction and spaced circumferentially about the axis of rotation of said members, and wherein a plurality of said elements are positioned between said members, each of said elements being elongated and joined at one point to a connector pin on one of said members and joined at a spaced point to a connector pin on the other of said members.

**70 Element is annular liner within radially spaced pin-receiving opening:**

This subclass is indented under subclass 51. Subject matter wherein a rotary drive or driven member includes means defining an aperture spaced in a radial direction of the rotational axis of one of said members for receiving a pin extending between said members, and wherein said element comprises a ringlike device positioned between the walls of said aperture and said pin.

**71 Axially directed pin:**

This subclass is indented under subclass 70. Subject matter wherein the longitudinal axis of said pin extends in a direction generally parallel to the rotational axis of the members.

**72 Plural axially spaced liners:**

This subclass is indented under subclass 71. Subject matter wherein there is provided a plurality of said ringlike devices spaced axially from each other, either in the same aperture or in separate apertures, in the same direction as the rotational axes of the members.

**73 Element positioned between intermeshing teeth on driving and driven members:**

This subclass is indented under subclass 51. Subject matter wherein a driving member includes a face having surfaces defining alternating ridges and valleys, and a driven member also includes a face having surfaces defining alternating ridges and valleys, the ridges of one member nesting within the valleys of the other member to provide surfaces facing each other, and wherein said element has portions positioned between said facing surfaces.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
157, for other coupling structure including axially intermeshing teeth, and see the search notes following subclass 157.
- 74 Teeth on radially overlapping surfaces:**  
This subclass is indented under subclass 73. Subject matter wherein the face having ridges and valleys on one of said members overlaps the face having ridges and valleys on the other of said members in a direction extending radially outwardly of the rotational axes of the members.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
158+, for other coupling structure including intermeshing teeth on radially overlapping surfaces, and see the search notes following subclass 158.
- 75 Element is a continuous annulus extending around rotational axis:**  
This subclass is indented under subclass 74. Subject matter wherein said element is ringlike in shape and encircles the rotational axis of said members, said element including projecting portions around its circumference which fit between said nesting ridges and valleys.
- 76 Plurality of disparate elements:**  
This subclass is indented under subclass 73. Subject matter including a plurality of individually separable elements.
- (1) Note. Patents in this subclass are distinguished from patents in subclass 73, in that, in subclass 73 a common element is shaped so as to provide surface portions between intermeshing teeth, while in this subclass (76) the elements are separable, at least at the initial stages of assembly between the teeth.
- 77 Element is an open loop spring curved about rotational axis:**  
This subclass is indented under subclass 51. Subject matter wherein said element is an elongated resilient device bent into the general shape of an open circle with the free ends spaced from each other on one side of the rotational axis of members interconnected by said element, and the curved portion between the ends extends around the rotational axis.
- 78 Element is a tube with slot through wall to provide flexibility:**  
This subclass is indented under subclass 51. Subject matter wherein said element is an elongated tube having an opening cut through the wall thereof to facilitate flexure of the element.
- 79 Element includes diverging wall portions defining annular groove completely surrounding Rotational axis (e.g., bellows):**  
This subclass is indented under subclass 51. Subject matter wherein said element comprises a pair of walls which meet at a common juncture and diverge from said juncture, said walls at said juncture following a circular circumferential path which surrounds and completely encloses the rotational axis of said element with said diverging walls defining a groove surrounding said rotational axis.
- 80 Nonmetallic:**  
This subclass is indented under subclass 79. Subject matter wherein said element is formed of a material other than metal.
- 81 Plural circumferentially spaced elements:**  
This subclass is indented under subclass 51. Subject matter wherein there is provided a plurality of said elements spaced circumferentially from each other about the rotational axes of driving and driven members interconnected by said elements.
- 82 Extending between radially overlapping surfaces on driving and driven members:**  
This subclass is indented under subclass 81. Subject matter wherein one of said members has a surface which overlaps a surface of the other of said members in a direction extending radially outwardly of the rotational axis, and wherein said elements extend between and interconnect said overlapping surfaces.
- 83 Nonmetallic:**  
This subclass is indented under subclass 82. Subject matter wherein said elements are made of a material other than metal.

- 84 Elements are bowed leaf springs:**  
This subclass is indented under subclass 81. Subject matter wherein said elements have a substantial length and width as compared to a thickness dimension, and are curved in the relaxed condition for deflection along said curve to provide flexure during torque transmission.
- 85 Nonmetallic:**  
This subclass is indented under subclass 81. Subject matter wherein said elements are formed of a material other than metal.
- 86 Axially extending torsion bars:**  
This subclass is indented under subclass 81. Subject matter wherein said elements are each in the form of an elongated rodlike device, and wherein flexibility is obtained by twist of said elements about their longitudinal axis.
- 87 Nonmetallic element:**  
This subclass is indented under subclass 51. Subject matter wherein said element is made of a material other than metal.
- 88 Element is hollow sleeve surrounding rotational axis and connected at opposite ends to axially spaced torque transmitting surfaces on driving and driven members:**  
This subclass is indented under subclass 87. Subject matter wherein said element is an elongated tube, the longitudinal axis of which is coincident with the rotational axes of driving and driven members interconnected by it, said tube being connected at one end to a torque transmitting surface on said driving member and being connected at the opposite end to a torque transmitting surface on said driven member.
- 89 Extending between radially overlapping surfaces on driving and driven members:**  
This subclass is indented under subclass 87. Subject matter wherein one of a driving or driven member interconnected by said element has a surface which overlaps a surface on the other member in a direction extending radially outwardly of the rotational axis of said members, and wherein said element extends between and interconnects said overlapping surfaces.
- 90 Plural elements radially overlapping:**  
This subclass is indented under subclass 89. Subject matter wherein a plurality of said elements are arranged in such a manner that one of said elements is positioned radially outwardly of another of said elements.
- 91 Plural elements axially spaced along rotational axis:**  
This subclass is indented under subclass 89. Subject matter wherein a plurality of said elements are spaced from each other along the rotational axes of the members.
- 92 Annular element between and coincident with drive and driven members:**  
This subclass is indented under subclass 87. Subject matter wherein said element comprises a ring-like or apertured disc-like body having a rotational center which is coincident with the longitudinal axis of driving and driven members that are interconnected by said body.
- 93 Including means to receive radially spaced axially extending projection on drive and driven members:**  
This subclass is indented under subclass 92. Subject matter wherein said body is provided with grooves or apertures for receiving an axially extending projection carried by each of said driving and driven members, said projections being spaced radially from the rotational axis of said members.
- 94 Laminated element or plural elements abutting or spaced along rotational axis:**  
This subclass is indented under subclass 93. Subject matter wherein said body is formed of a plurality of laminated nonmetallic parts, or wherein a plurality of said bodies are distributed along the rotational axis of said members in either contacting or spaced apart relationship.
- 95 With disparate spacer between plural separable elements:**  
This subclass is indented under subclass 94. Subject matter wherein said bodies are separable and spaced apart axially from each other, and wherein a separate spacer member formed of a different material than said bodies is positioned between said bodies.

**96 Laminated element or plural elements abutting or spaced along axis of rotation:**

This subclass is indented under subclass 92. Subject matter wherein said body is formed of a plurality of nonmetallic parts laminated together, or wherein a plurality of said bodies are distributed along the rotational axis of said members in either contacting or spaced apart relationship.

SEE OR SEARCH THIS CLASS, SUBCLASS:

94+, for similar structure and further including means to receive radially spaced axially extending projections on the drive and driven members.

**97 Element is a torsion bar having a longitudinal axis coincident with the rotational axis:**

This subclass is indented under subclass 51. Subject matter wherein said element is an elongated rod which transmits torque by rotation about its longitudinal axis which is coincident with the axes of the members, and wherein flexibility is obtained by twist of said rod about its longitudinal axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

86, for a coupling including plural, circumferentially spaced torsion bars.

**98 Element is plate with external edge completely surrounding rotational axis (e.g., disc):**

This subclass is indented under subclass 51. Subject matter wherein said element connects driving and driven members and comprises a disc-like body having a center of rotation coinciding with, and an outer circumferential edge completely surrounding the rotational axes of the members.

**99 Plural axially spaced plates:**

This subclass is indented under subclass 98. Subject matter wherein a plurality of said bodies are spaced apart axially from each other along the rotational axis.

**100 Element is leaf spring:**

This subclass is indented under subclass 51. Subject matter wherein said element is a strip-like body having a substantially greater length

and width when compared to its thickness dimension.

**101 Bowed:**

This subclass is indented under subclass 100. Subject matter wherein said body is curved in the relaxed condition for deflection along said curve to provide flexure during torque transmission.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84, for a coupling including plural bowed leaf springs circumferentially spaced about the rotational axis.

**102 SEPARATE COUPLING DEVICE MOVABLE RADIALLY OF AXES TORQUE TRANSMITTING MEMBERS TO ACCOMMODATE PARALLEL, MIS-ALIGNED AXES (E.G., OLDDHAM COUPLING):**

This subclass is indented under the class definition. A flexible coupling including a disparate device positioned and between drive and driven members having rotational axes which are parallel but out of alignment with each other, said device being mounted for reciprocable movement in a radial direction during each revolution of the drive and driven members.

**103 Coupling device includes rolling body for transmitting torque:**

This subclass is indented under subclass 102. Subject matter wherein torque is transmitted between the drive and driven members via a spherical or other rotary body, mounted for rotary motion about its own axis, which is spaced from the rotational axis of the drive and driven members.

**104 Coupling device has aperture or groove for receiving complementary driving projection on torque transmitting members:**

This subclass is indented under subclass 102. Subject matter wherein said coupling device includes means defining an opening or channel into which is positioned a protuberance carried by the drive or driven member for relative reciprocable movement of said protuberance in said opening or channel.

**105 Projection-receiving slot extends completely through thickness dimension of coupler:**

This subclass is indented under subclass 104. Subject matter wherein said device includes oppositely facing surfaces longitudinally spaced from each other along the rotational axes of the drive and driven members, and wherein said opening extends from one of said surfaces through the other of said surfaces.

**106 COUPLING ACCOMMODATES DRIVE BETWEEN MEMBERS HAVING MIS-ALIGNED OR ANGULARLY RELATED AXES:**

This subclass is indented under the class definition. A flexible coupling including structure which facilitates transfer of rotary torque between members wherein the rotational axes of the members are out of alignment with each other, or wherein the rotational axis of one of the members defines an angle of less than 180° with the rotational axis of the other of the members.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 19, for coupling structure which facilitates angular displacement of fluid-conducting rotary shafts.
- 49, 50 and 102+, for particular kinds of couplings accommodating misalignment or angular relationship between coupled members.
- 51+, for coupling structure wherein torque is transmitted via an element made of flexible material and which may accommodate misaligned or angularly related axes.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 15.6+ for a power takeoff from a shaft extension.
- 180, Motor Vehicles, subclasses 254+ for a vehicle having a driven and steerable wheel and including a flexible drive transmitting means for transmitting torque to the wheel.
- 279, Chucks or Sockets, subclass 16 for a self-centering chuck or socket.

- 403, Joints and Connections, subclasses 52+ for a joint between articulated members other than rotary torque transmitting members.

- 433, Dentistry, subclass 112 for a flexible shaft transmission in dental apparatus.

**107 Coupling between wheel and vertically oriented shaft (e.g., millstone):**

This subclass is indented under subclass 106. Subject matter wherein one of the members is a shaft having its rotational axis oriented in a vertical direction, and the other of the members is a rotary body including a hub portion mounted on said shaft for facilitating relative angular movement of the rotational axis of the hub with respect to the rotational axis of the shaft.

SEE OR SEARCH CLASS:

- 241, Solid Material Comminution or Disintegration, subclasses 291+ for comminuting structure mounted on a drive shaft therefor.

**108 Wheel mounted on rolling body:**

This subclass is indented under subclass 107. Subject matter wherein balls or rollers support said hub for rotation.

**109 Coupling includes relatively movable gear segments:**

This subclass is indented under subclass 106. Subject matter wherein said structure includes relatively movable parts having teeth interengageable with each other, wherein teeth on one of the parts sequentially move from engaged to disengaged positions with respect to cooperating teeth on the other of said parts when the axes of said members move to different relative angular positions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 4, for a pivoted weight including a gear segment in a speed responsive device for adjusting the relative rotational position of coupled members.

- 110 Coupling transmits torque via semicylindrical segments separated by pivot pin (e.g., slipper bearing):**  
This subclass is indented under subclass 106. Subject matter wherein said structure includes a pair of spaced semicylindrical parts interconnected between their ends by a pivot pin, the semicylindrical parts and pivot pin being received in a cylindrical aperture of one of said members, and the other of said members including an axially extending tongue portion pivotally mounted on said pin.
- 111 Tripod coupling:**  
This subclass is indented under subclass 106. Subject matter wherein said structure includes three pins extending along its own axis which is angularly related with respect to the rotational axes of the driving and driven members, and the axes of the pins being circumferentially spaced 120° apart about the rotational axes of the driving and driven members.
- 112 Coupling transmits torque via radially directed pin:**  
This subclass is indented under subclass 106. Subject matter wherein said structure includes an element having a cylindrical surface wherein the axis of the cylinder extends in a radial direction perpendicular to the rotational axis of a part which carries the element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
11+, for a coupling including lubrication means associated with a radially directed pin.  
70+, for a coupling including a pin received in an opening having an annular liner of flexible material.
- 113 With additional axially spaced torque-transmitting coupling which facilitates relative movement between members:**  
This subclass is indented under subclass 112. Subject matter, and further including an additional coupling spaced from said element in a direction along the rotational axes of said coupled members, said additional coupling facilitating relative movement of said coupled members during torque transmission.
- 114 Radially directed pin in each coupling:**  
This subclass is indented under subclass 113. Subject matter wherein said additional coupling also includes an element having a cylindrical surface wherein the axis of the cylinder extends in a radial direction perpendicular to the axis of rotation of a part which carries the element.
- 115 Pin slidable axially in slot:**  
This subclass is indented under subclass 114. Subject matter wherein one of said members includes walls defining a passage extending in the same direction as the rotational axis of said one of said members, said passageway receiving one of said elements and permitting relative axial movement of said one of said elements between said walls.
- 116 Axially spaced pin-carrying parts interconnected by pivotal head and socket centering joint:**  
This subclass is indented under subclass 115. Subject matter wherein a separate part carries each of said axially spaced coupling elements, and wherein one of said parts includes head structure arranged along the axis of rotation of interconnected members, and said other of said parts includes socket structure also arranged along the axis of rotation of said interconnected members, said head being received in said socket for relative pivotal movement to provide a centering effect.
- 117 Plural pins in each coupling with pin ends spaced 90 degrees apart:**  
This subclass is indented under subclass 114. Subject matter wherein each of said parts carries a plurality of cylindrical elements, the ends of said elements on each part being spaced 90° circumferentially about the rotational axis of the part.
- 118 Axially spaced pin-carrying parts interconnected by pivotal head and socket centering joint:**  
This subclass is indented under subclass 117. Subject matter wherein a separate part carries each of said axially spaced coupling elements, and wherein one of said parts includes head structure arranged along the axis of rotation of said interconnected members, and said other of said parts includes socket structure also



- arranged along the axis of rotation of said interconnected members, said head being received in said socket for relative pivotal movement to provide a centering effect.
- 119 Pins in sequential couplings oriented at right angles to each other:**  
This subclass is indented under subclass 114. Subject matter wherein the axis of the cylindrical element in one of said couplings is oriented 90° with respect to the axis of said element in said axially spaced coupling.
- 120 Pin slidable axially in slot:**  
This subclass is indented under subclass 112. Subject matter wherein one of said members includes walls defining a passage extending in the same direction as the rotational axis of said one of said members, said passageway receiving said element and permitting relative axial movement of said element between said walls.
- 121 Pin carried by intermediate element and slidable axially in slots in both coupled members:**  
This subclass is indented under subclass 120. Subject matter wherein each of said members includes walls defining a passage extending in the same direction as the rotational axis of said members, and wherein said element, carried by a separate part between said members, is positioned for relative axial movement in the passageways between the wall of each of said members.
- 122 Pin carries disparate sleeve engaged with slot walls:**  
This subclass is indented under subclass 120. Subject matter wherein a separate member encircles said element and is movable therewith for engagement with the walls defining said passageway to guide said element during said relative axial movement.
- 123 Sleeve rotatable about pin axis:**  
This subclass is indented under subclass 122. Subject matter wherein said separate member is rotatable about the axis of said element.
- 124 Sleeve has spherical or semispherical bearing surface:**  
This subclass is indented under subclass 123. Subject matter wherein the surface of said member engageable with said walls is spherical or semispherical in cross-sectional configuration.
- 125 Plural pins received in conforming apertures in ring:**  
This subclass is indented under subclass 112. Subject matter wherein an annulus having a circumferentially continuous wall surrounds the axis of rotation of said members, said wall being provided with a plurality of circumferentially spaced openings, each of said openings receiving one of a plurality of circumferentially spaced torque transmitting elements.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
12+, for a coupling wherein a ring encapsulates a pin, and wherein the ring provides a lubricant passageway.
- 126 Split ring:**  
This subclass is indented under subclass 125. Subject matter wherein said annulus is formed of separate parts, each of said parts including surface portions configured to provide a part of said openings.
- 127 With particular balancing means:**  
This subclass is indented under subclass 112. Subject matter wherein significance is attributed to structure for minimizing vibration imparted to coupled members during torque transmission.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
180, for a shaft having particular balancing means.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, subclasses 572+ for a flywheel or rotor with vibration dampening or balancing means.
- 128 With particular bearing cup surrounding pin end:**  
This subclass is indented under subclass 112. Subject matter wherein significance is attributed to a separate cap which is positioned over the end of said element, said cap enclosing the top and extending at least partially along the cylindrical side surfaces of said element.

- 129 Spherical or semispherical cup:**  
This subclass is indented under subclass 128. Subject matter wherein the external surface of said cap is spherical or semispherical in cross-sectional configuration.
- 130 And disparate device for securing cup to pin or receiver:**  
This subclass is indented under subclass 128. Subject matter and further including a separate member for attaching said cap to said element or to a device which receives said element.
- 131 And flexible seal:**  
This subclass is indented under subclass 128. Subject matter and further including a seal formed of flexible material, e.g., a lubricant seal.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
11+, for a flexible coupling including lubricating means associated with a pin received in a conforming aperture.
- SEE OR SEARCH CLASS:  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 549+ for a dynamic circumferential contact seal for other than a piston having a peripheral radially sealing flexible projection (e.g., lip seal, etc.).
- 132 With particular bearing or bushing mounted on pin:**  
This subclass is indented under subclass 112. Subject matter wherein significance is attributed to a separate device encircling said element for minimizing friction between said element and a part which pivots relative to said element.
- 133 With particular flexible seal:**  
This subclass is indented under subclass 112. Subject matter wherein significance is attributed to a seal made of flexible material, e.g., a lubricant seal.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
7+, for a flexible coupling associated with particular lubricating means.
- 131, for a flexible seal associated with a bearing cup on a pin end.
- SEE OR SEARCH CLASS:  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 549+ for a dynamic, circumferential, contact seal for other than a piston having a peripheral radially sealing flexible projection (e.g., lip seal, etc.).
- 134 With particular yoke providing pin-receiving aperture:**  
This subclass is indented under subclass 112. Subject matter wherein significance is attributed to structure which is U-shaped or Y-shaped with one leg on each side of the axis of rotation of said members, the legs including openings for receiving a plurality of elements.
- 135 Split yoke:**  
This subclass is indented under subclass 134. Subject matter wherein said structure is formed of separable parts.
- 136 Plural pins carried by intermediate member with pin ends spaced 90 degrees apart:**  
This subclass is indented under subclass 112. Subject matter wherein a plurality of said cylindrical elements are carried by structure which is mounted between said members, and wherein the ends of said elements are spaced circumferentially 90° apart.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
117+, for axially spaced couplings each including plural pins with pin ends spaced 90° apart.
- 137 Coupling transmits torque via axially directed pin radially spaced from rotational axis:**  
This subclass is indented under subclass 106. Subject matter wherein said structure includes an element having a cylindrical surface, and wherein the axis of the cylinder is radially spaced from the axis of rotation of said members and extends in a direction parallel to the axis of rotation of said members.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 71+, for a coupling including an axially directed radially spaced pin received within an opening having a liner made of flexible material.
- 138 Particular pivotal mounting for pin:**  
 This subclass is indented under subclass 137. Subject matter wherein significance is attributed to means for mounting the element relative to its supporting structure in order to facilitate pivotal motion of the element.
- 139 Coupling transmits torque via radially spaced ball:**  
 This subclass is indented under subclass 106. Subject matter wherein said structure includes a spherical element spaced radially from the axis of rotation of said members for transmitting torque between said members.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 15, for a coupling including lubrication means associated with a radially spaced ball.  
 35+, for an overload release coupling having torque transmitted via a ball.
- 140 With additional axially spaced torque-transmitting coupling which facilitates relative movement between members:**  
 This subclass is indented under subclass 139. Subject matter and further including an additional coupling spaced from said spherical element in a direction along the rotational axes of said coupled members, said additional coupling facilitating relative movement of said coupled members during torque transmission.
- 141 Ball mounted in groove for relative axial movement with respect to coupled member:**  
 This subclass is indented under subclass 139. Subject matter wherein said spherical element is mounted in an axially extending channel formed in one of said members for relative axial movement of said element with respect to said one of said members.
- 142 Mounted for relative axial movement with respect to both coupled members:**  
 This subclass is indented under subclass 41. Subject matter wherein the other of said coupled members also includes means permitting relative axial movement between said element and said other of said coupled members.
- 143 Grooves formed in radially overlapping elements:**  
 This subclass is indented under subclass 142. Subject matter wherein an internal axially extending channel is formed on one of said members, and an external axially extending channel is formed on the other of said members, said internal channel being located radially outwardly from said external channel with and said spherical element being positioned for relative axial movement in each of said channels.
- 144 Intersecting grooves:**  
 This subclass is indented under subclass 143. Subject matter wherein the internal channel is out of alignment in an axial direction with the external channel.
- 145 With intermediate positioning cage for ball:**  
 This subclass is indented under subclass 143. Subject matter wherein a separate annular device is positioned intermediate said channels, said device including openings for receiving said spherical element.
- 146 Bottom wall of groove in outer member is parallel to axial centerline of outer member (e.g., internally grooved cylinder):**  
 This subclass is indented under subclass 145. Subject matter wherein said internal channel is defined by opposed side walls and a top wall, and said top wall extends in a direction parallel to the axial centerline of the member having said internal channel formed therein.
- 147 Torque transmitted via intermediate element:**  
 This subclass is indented under subclass 106. Subject matter wherein said structure includes means interconnecting driving and driven members, said means being relatively movable with respect to each of said members.

**148 Element carries or receives hook on opposite ends for connection to drive and driven members (e.g., link chain):**

This subclass is indented under subclass 147. Subject matter wherein said interconnecting means includes cooperating parts, at least one of said parts including a portion bent back upon itself along the rotational axis to provide a loop which cooperates with a portion on the other of said parts to accommodate said relative movement during torque transmission.

- (1) Note. The term hook as used herein includes also an eye.

**149 Axially intermeshing teeth:**

This subclass is indented under subclass 147. Subject matter wherein said interconnecting means includes a body having opposite end faces, each of said end faces having a surface defined by alternating axially facing ridges and valleys, said surfaces cooperating with complementary axially facing surfaces on said members to accommodate said relative movement during torque transmission.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, for a coupling including lubrication means associated with intermeshing teeth.
- 73, for coupling structure including axially intermeshing teeth and having an element formed of flexible material between the teeth to transmit torque.
- 157, for other coupling structure including axially intermeshing teeth.

**150 Intermediate element located between overlapping surfaces on drive and driven members:**

This subclass is indented under subclass 147. Subject matter wherein said interconnecting means includes a body positioned relative to the driving and driven members in such a manner that a plane perpendicular to the axis of rotation of said members intersects surface portions of said body and both of said members.

**151 Intermediate element is externally grooved or ribbed sphere:**

This subclass is indented under subclass 150. Subject matter wherein said body is spherical and includes slots or projections on its outer surface for cooperating with complementary surfaces on the driving and driven members.

**152 Plural circumferentially spaced intermediate elements:**

This subclass is indented under subclass 150. Subject matter including a plurality of said bodies circumferentially spaced from each other around the rotational axes of said driving and driven members.

**153 Intermediate element includes internal openings at opposite ends for receiving axially spaced ends on drive and driven members:**

This subclass is indented under subclass 147. Subject matter wherein said interconnecting means comprises a body having opposite ends spaced axially along the axis of rotation, and wherein each of said ends includes a wall having a circumferentially continuous surface facing inwardly toward the rotational axis and configured to receive and mate with a complementary outwardly facing surface on axially spaced ends of the driving and driven members.

**154 Intermeshing teeth on element and members:**

This subclass is indented under subclass 153. Subject matter wherein said inwardly facing surfaces comprise alternating ridges and valleys which mesh with complementary alternating ridges and valleys forming said outwardly facing surfaces.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 158+, for other coupling structure including radially overlapping teeth, and see the search notes following subclasses 158+.

**155 Intermediate member includes external surface at opposite ends received in comple-**

**mentary openings in axially spaced ends of driving and driven members:**

This subclass is indented under subclass 147. Subject matter wherein said interconnecting means comprises a body having opposite ends spaced axially along the axis of rotation, and wherein each of said ends includes a circumferentially continuous surface facing outwardly of the rotational axis, said outwardly facing surface being configured to mate with complementary inwardly facing surfaces defining openings in axially spaced ends of the driving and driven members.

**156 Intermeshing teeth on element and members:**

This subclass is indented under subclass 155. Subject matter wherein said outwardly facing surfaces comprise alternately ridges and valleys which nest with complementary alternating ridges and valleys forming said inwardly facing surfaces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

158+, for other coupling structure including radially overlapping teeth, and see the search notes following subclass 158.

**157 Torque transmitted via intermeshing teeth on drive and driven members:**

This subclass is indented under subclass 106. Subject matter wherein a surface on one of said members includes a plurality of alternating ridges and valleys which mate with a plurality of alternating ridges and valleys formed on a surface of the other of said members.

SEE OR SEARCH THIS CLASS, SUBCLASS:

16, for a coupling including lubrication means associated with intermeshing teeth.

73+, and 149, for other coupling structure including axially intermeshing teeth.

**158 Teeth on radially overlapping surfaces:**

This subclass is indented under subclass 157. Subject matter wherein the alternating ridges and valleys on one of said members are formed on an inwardly facing surface which is located radially outwardly from the other of said surfaces having said alternating ridges and valleys.

SEE OR SEARCH THIS CLASS, SUBCLASS:

16, for coupling structure including lubrication means associated with intermeshing teeth.

74+, 154 and 156, for other coupling structure including radially overlapping intermeshing teeth.

**159 Spherical or semispherical surfaces:**

This subclass is indented under subclass 158. Subject matter wherein at least one of said surfaces carrying said alternating ridges and valleys is spherical or partially spherical in shape.

**160 COUPLING FACILITATES RELATIVE ROTARY DISPLACEMENT BETWEEN COUPLED MEMBERS:**

This subclass is indented under the class definition. A flexible coupling wherein means is provided to accommodate relative rotation between coupled members about their respective rotational axes.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for a coupling including a speed responsive device to adjust relative rotational position of coupled members.

24+, for a coupling wherein a fluid is used to affect the movement of coupled members.

30+, for a coupling wherein relative rotary displacement occurs due to overload release.

51+, for a coupling facilitating relative rotary motion wherein torque is transmitted via an element made of flexible material.

**161 Members coupled via axially movable, resiliently biased intermediate element:**

This subclass is indented under subclass 160. Subject matter wherein torque is transmitted from one member to the other via a separate body, said body being movable relative to both of said members along the axis of rotation of the members, and said body being biased by a spring along said axial direction.

**162 COUPLING FACILITATES RELATIVE AXIAL MOTION BETWEEN COUPLED MEMBERS:**

This subclass is indented under the class definition. A flexible coupling having means to accommodate relative movement between the coupled members along their rotational axes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 18+, for a coupling facilitating relative axial motion between interconnected shafts in a drill string.
- 24+, for a coupling wherein a fluid is used to affect movement of coupled members.
- 51+, for a coupling facilitating relative axial motion wherein torque is transmitted via an element made of flexible material.
- 172, for a coupling facilitating relative telescopic movement between mating housing parts.

SEE OR SEARCH CLASS:

- 173, Tool Driving or Impacting, subclasses 165+ for means to drive a tool about an axis and including a relatively fixed drive for an advancing tool.
- 384, Bearings, subclasses 43+, 49, 50+ for an antifriction ball or roller bearing.

**163 Coupling between rotary drive table and axially movable drill string:**

This subclass is indented under subclass 162. Subject matter wherein one of said members is a rotating pipe used in an earth-boring operation, and the other of said members is a device positioned around the external circumference of the pipe for transmitting rotary torque to the pipe.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 18+, for a coupling facilitating relative movement between interconnected shafts in a drill string.

SEE OR SEARCH CLASS:

- 173, Tool Driving or Impacting, subclasses 165+ for means to drive a tool about an axis and including a rela-

tively fixed drive for an advancing tool.

- 175, Boring or Penetrating the Earth, subclass 195 for a rotary drive table for a relatively advancing tool wherein significance is attributed to table structure.

**164 Coupler includes endless belt or chain run engageable with drill string and movable in direction of axial advance:**

This subclass is indented under subclass 163. Subject matter wherein said coupling means comprises a closed loop belt or chain entrained for movement around and between spaced rotational axes, and wherein one run of said belt or chain engages and moves with said pipe along the rotational axis of the pipe.

**165 Coupler includes antifriction rolling body engageable with drill string:**

This subclass is indented under subclass 163. Subject matter wherein said coupling means includes a body rotatable about its own axis and engaging the external periphery of the pipe for facilitating axial movement of the pipe.

**166 With screw device for adjusting radial position of rolling body:**

This subclass is indented under subclass 165. Subject matter and including an elongated threaded member rotatable about its own axis and coupled to said rotary body in such a manner that rotary movement of the threaded member causes linear movement of said rotary body in a direction toward or away from the rotational axis of the pipe.

**167 Coupler includes antifriction rolling body engageable with axially moveable member:**

This subclass is indented under subclass 162. Subject matter wherein said coupling means includes a body rotatable about its own axis and engaging the external periphery of one of said members for facilitating axial movement of said one of said members.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 165, for an antifriction roller engageable with an axially movable drill string.

**168 Recirculating rolling bodies:**

This subclass is indented under subclass 167. Subject matter wherein a plurality of bodies mounted for movement individually along a closed loop path are supported for engagement with said axially movable member along a axial extent of the member.

**169 Including spring to bias member in axial direction:**

This subclass is indented under subclass 162. Subject matter wherein a resilient device is associated with one of said members to bias said member along the rotational axis of the member.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

20+, for resilient means biasing relatively movable, fluid conducting rotary shafts in an axial direction.

36, 38+, 43+, and 46+, for axially resilient biasing means associated with an overload release coupling.

**170 HOUSING:**

This subclass is indented under the class definition. A housing as defined in the ...

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52+, for a housing combined with a torque transmitting member made of flexible material.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 606+ for a gear casing.

**171 Rigid semispherical surface on one housing part slidably engaged with surface on mating housing part:**

This subclass is indented under subclass 170. Subject matter wherein said enclosure is formed of a plurality of relatively movable components, one of said components being rigid and having a semispherical surface portion which engages a corresponding surface portion on another of said components.

**172 Telescoping cylindrical housing members:**

This subclass is indented under subclass 170. Subject matter wherein said enclosure is formed of a plurality of cylindrical components, one of said components fitting within the other of said components, and said components being mounted with respect to each other for relative movement along the rotational axis of the shaft or coupling which is surrounded by said enclosure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

162+, for a coupling facilitating relative axial motion between torque transmitting members.

**173 Flexible housing:**

This subclass is indented under subclass 170. Subject matter wherein the enclosure is formed of a material which is flexible, per se, or which is configured in such a manner as to permit flexure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52+, for a flexible housing combined with a shaft of flexible material.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 18 for motion transmitting means including a flexible sealing diaphragm connected to a moving rod and casing; and subclasses 489 and 500.5+ for flexible push-pull motion transmitting means such as a Bowden Cable.

138, Pipes and Tubular Conduits, subclasses 118+ for a flexible conduit.

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 504 for a dynamic, circumferential, contact seal for other than a piston that accommodates gyratory or oscillatory motion by using a flexible connection having static contact between the seal and one of the relatively movable parts or subclasses 634+ for a static, contact seal for other than an internal combustion engine, or a pipe, conduit, or cable that is a flexible sleeve, boot, or diaphragm.

**174 Helically coiled member:**

This subclass is indented under subclass 173. Subject matter wherein said enclosure includes a helically coiled component.

**175 Corrugated structure:**

This subclass is indented under subclass 173. Subject matter wherein said enclosure has an undulating surface.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

79+, for a flexible element in the form of a bellows which transmits torque.

**176 Pivotally mounted housing supported for movement between open and closed positions:**

This subclass is indented under subclass 170. Subject matter wherein said enclosure includes a component which is pivotally supported about an axis so that said component can be moved to permit access to the shaft or coupling surrounded by said enclosure.

**177 Separably connected housings for separably connected shafts:**

This subclass is indented under subclass 170. Subject matter comprising separate enclosures for separate shafts and including means for interconnecting said separate enclosures when said shafts are interconnected.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52+, for a housing combined with a shaft of flexible material and including means for attachment to an auxiliary housing.

182, for a disparate device for separably connecting one shaft to another.

**178 With rolling body supporting shaft in housing:**

This subclass is indented under subclass 170. Subject matter wherein a body rotatable about its own axis is mounted between said enclosure and a shaft surrounded by said enclosure for facilitating rotation of said shaft within said enclosure.

**179 SHAFTING:**

This subclass is indented under the class definition. A shaft as defined in the ... .

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51+, for a shaft made of flexible material or a shaft including flexible material providing a torque transmitting coupling between shaft sections.

106+, for a shaft made of sections articulated along the longitudinal extent of the shaft axis.

SEE OR SEARCH CLASS:

295, Railway Wheels and Axles, subclasses 36+ for an axle of that class.

301, Land Vehicle: Wheels and Axles, subclasses 124.1+ for an axle of that class.

440, Marine Propulsion, subclass 83 for shafting with a screw propeller in marine propulsion apparatus.

**180 Particular vibration dampening or balancing structure:**

This subclass is indented under subclass 179. Subject matter wherein significance is attributed to structure associated with the shaft for the purpose of minimizing unwanted vibrations during torque transmission or for providing a desirable balance to the shaft structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

127, for balancing means associated with a trunnion style of universal joint.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 572+ for a flywheel or rotor with balancing or vibration dampening means.

**181 Nonmetallic shaft or component:**

This subclass is indented under subclass 179. Subject matter wherein said shaft or a portion thereof is made of a material other than metal.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51+, for a shaft made of flexible material or combined with an element made of



flexible material to provide a torque transmitting coupling between shaft sections.

**182 With disparate device for coupling shaft to additional shaft or rotary body:**

This subclass is indented under subclass 179. Subject matter wherein separate means is provided to connect the shaft to another shaft or to another rotary body.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 52+, for a flexible shaft and housing which may include means to couple to an auxiliary shaft and housing.
- 177, for separably connected housings for separably connected shafts.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 15.6+ for a power takeoff from a shaft extension.
- 403, Joints and Connections, appropriate subclasses for a joint or connector, per se, and see a reference to the line in the search class notes following the general definition of Class 464.

**183 Hollow or layered shaft:**

This subclass is indented under subclass 179. Subject matter wherein said shaft is hollow along its length, or wherein the shaft is formed of plural concentric layers of material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 18+, for a flexible coupling between rotary fluid-conducting shafts.

SEE OR SEARCH CLASS:

- 138, Pipes and Tubular Conduits, appropriate subclasses for a hollow pipe.
- 175, Boring or Penetrating the Earth, subclasses 320+ for a tool shaft detail, and see the reference to Class 175 in the search class notes under the class definition of Class 464.

**184 GUDGEONS:**

This subclass is indented under the class definition. A gudgeon as defined in the ...

SEE OR SEARCH CLASS:

- 29, Metal Working, for a roll or roller, per se, having a generally cylindrical work contacting surface.
- 160, Flexible or Portable Closure, Partition, or Panel, subclass 326 for a gudgeon combined with a roller that accumulates material on a roll.

**185 MISCELLANEOUS:**

This subclass is indented under the class definition. Subject matter not provided for in the previous subclasses.

**CROSS-REFERENCE ART COLLECTIONS**

**900 ELECTRICALLY INSULATIVE MEMBER:**

Structure wherein significance is attributed to the use of a material having electrically insulative properties in a shaft or shaft coupling.

**901 RAPID ATTACHMENT OR RELEASE:**

Structure wherein significance is attributed to means which enables coupled members to be quickly connected or disconnected.

**902 PARTICULAR MATERIAL:**

Structure wherein significance is attributed to the particular composition of material used in making a structure of this class.

**903 Nonmetal:**

This subclass is indented under subclass 902. Subject matter wherein the composition includes a nonmetallic component.

**904 HOMOKINETIC COUPLING:**

A flexible coupling wherein significance is attributed to structure that obtains a uniform angular velocity between input and output members.

**905 Torque transmitted via radially extending pin:**

This subclass is indented under subclass 904. Subject matter wherein torque is transmitted by a pin which extends radially outwardly of the rotational axes of the coupled members.

**906      Torque transmitted via radially spaced balls:**

This subclass is indented under subclass 904. Subject matter wherein torque is transmitted by spherical elements spaced radially outwardly of the rotational axis of the coupled members.

END